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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/575,709	07/20/2000	Daniel P. Weitekamp	06618/488001/CIT/3024	5306
20985	7590	05/21/2004		
FISH & RICHARDSON, PC 12390 EL CAMINO REAL SAN DIEGO, CA 92130-2081				
			EXAMINER LYONS, MICHAEL A	
			ART UNIT 2877	PAPER NUMBER

DATE MAILED: 05/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/575,709

Applicant(s)

WEITEKAMP ET AL.

Examiner

Michael A. Lyons

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 April 2004.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 5-21 and 63-70 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☒ Claim(s) 63-70 is/are allowed.
6) ☒ Claim(s) 5-21 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 20 July 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____

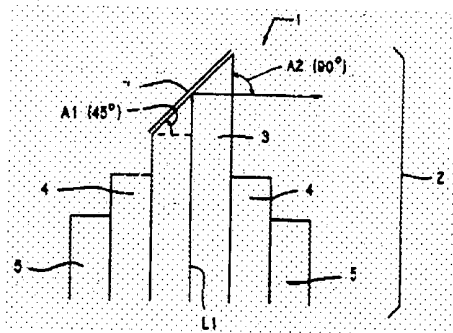
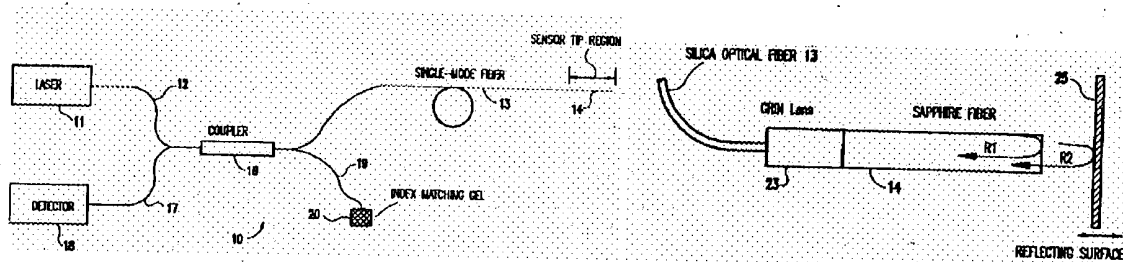
DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5-12 and 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murphy et al (5,381,229) in view of Payne et al (5,253,312).



Regarding claim 5, Murphy (Figs. 1 and 3) discloses a device comprising a laser 11, a single mode optical fiber 13 having a sensor tip region 14 having a second end facet that is partially reflective (light beam R1), a reflecting surface 25 as a measurand surface that forms an interferometer within the fiber and the sensor due to interference between light R1 in the sensor and light R2 reflecting off of the measurand, and a photodetector 18 coupled via coupler 16 to

detect the interference generated by the device. Murphy, however, fails to disclose the exact angle of the tapered fiber or a perpendicular light path out of the fiber after reflection.

Payne (Fig. 1A) discloses a fiber tip for use in a laser delivery system at the end of an optical fiber where the tip of the fiber is angled at 45 degrees (A1), causing the light to exit the fiber perpendicularly (A2) towards whatever surface or measuring area is external to the fiber. It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the tip of Payne to the device of Murphy in order to clarify the actual function and specifications of the second fiber end. Angling the tip of Murphy, while keeping the partially reflective coating on the end, would make the device more compact without losing any of the functionality of the original device, as the measurand surface would be directly below the fiber sensor and perpendicular to the light exiting the fiber as claimed.

As for claim 6, the use of a not-flat fiber end is a matter of design choice, as the light would reflect off of a non-flat end similarly to a flat end.

As for claim 7, having multiple planes for light reflection is a matter of design choice, as it would create multiple areas of reflection on the measurand surface for more measurements.

As for claim 8, the end of the tip of Payne is polished and elliptical.

As for claim 9, the end of the tip of Murphy is coated with a partially light-reflecting material in order to reflect the light out of the fiber while keeping a portion of the light within the fiber for interference.

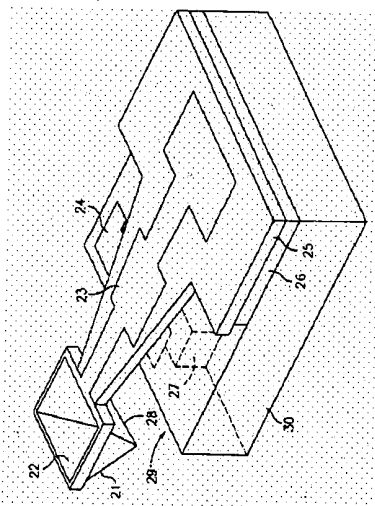
As for claims 10 and 11, Murphy's fiber is optically coupled to the laser and the photodetector by coupler 16.

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As for claim 12, the spacing of the fiber and the measuring surface to create a maximum signal is a matter of design choice, as a maximum signal would merely generate a stronger result.

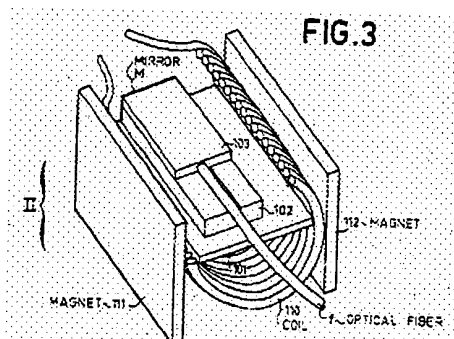
As for claims 18-21, Official Notice is taken as to the modifications listed in the claims as being all well known modifications and uses of optical fiber sensors in interferometry.

Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murphy et al (5,381,229) in view of Payne et al (5,253,312) and in further view of Hong et al (5,982,009).



As for claims 13-15, the combination of Murphy and Payne are disclosed above. However, this combination fails to disclose their use on a substrate with a mechanical oscillator such as a cantilever allowing movement of the fiber on the substrate. Hong discloses a device with a substrate 30 and a cantilever as a mechanical oscillator on the substrate that can be used with an optical fiber (Col. 8, lines 49-53). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the fiber of Murphy and Payne onto a substrate with a cantilever as per Hong to facilitate movement of the fiber with regard to the measurand.

Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murphy et al (5,381,229) in view of Payne et al (5,253,312) and in further view of Doriath et al (4,516,073).



As for claim 16, the combination of Murphy and Payne are disclosed above. However, this combination fails to disclose their use within a magnetic system. Doriath discloses a device where an optical fiber is contained in a system containing static magnets 111 and 112 with the fiber between the gap in the magnets. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to place the fiber of Murphy and Payne in the magnetic field device of Doriath in order to locate the fiber and measurand in a static magnetic field for any desired measurements.

As for claim 17, the use of a moveable magnet in a system attached to a measuring surface is a matter of design choice.

Allowable Subject Matter

Claims 63-70 are allowed in view of the prior art.

The section under "Allowable Subject Matter" in the Office Action mailed January 22, 2004 contains the reasons for the allowability of these claims.

Response to Arguments

Applicants' arguments filed April 22, 2004 have been fully considered but they are not persuasive. The applicants' first argue that the claims in the instant application recite a "transverse" fiber device. However, nowhere in the claims is this term applied, making the argument moot because it does not address a claim limitation.

Additionally, the applicants argue that the Murphy device features a reflecting surface (as a measurand) perpendicular to the fiber, while in the claims the measurand is parallel to the fiber core. As mentioned above in the rejection of claim 5, angling the tip of Murphy, while keeping the partially reflective coating on the end, would make the device more compact without losing any of the functionality of the original device, as the measurand surface would be directly below the fiber sensor and perpendicular to the light exiting the fiber as claimed. Having the reflecting surface be directly below the fiber sensor and perpendicular to the light exiting the fiber makes the surface parallel to the fiber core. If the reflecting surface were to remain perpendicular to the modified angular surface, the light exiting from the partially reflective angled tip would not strike the reflecting surface; it would be obvious to have the surface parallel for the device to function.

Finally, the applicants argue that the arrangement of the device fails to yield an optical interferometer. As shown in Figure 3 of Murphy, part of the incoming light beam R1 reflects off the end of the sapphire fiber as a reference beam. The remainder of the incoming light beam R2 reflects off the reflecting surface. Since the reflecting surface is external to the fiber, there is an optical path length difference between R2 and R1. When the light from R2 returns to the fiber, it mixes with the R1 light reflecting off the edge of the fiber, and since the R2 light has an optical

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path length difference from the R1 light, the mixing light interferes, making the device an optical interferometer.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael A. Lyons whose telephone number is 571-272-2420. The examiner can normally be reached on Monday thru Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G Font can be reached on 571-272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MAL
April 29, 2004



Frank G. Font
Supervisory Patent Examiner
Technology Center 2800